MECHANIC'S GUIDE

SNOWPLOWS

Featuring the

Insta-Act® Hydraulic System

and the

E-Force Isolation Module System

⚠️ CAUTION
Read this manual before servicing the snowplow.
This guide has been prepared to help the trained mechanic service FISHER® snowplows. It also provides safety information and recommendations. We urge all mechanics to read this manual carefully before attempting to service the FISHER snowplow equipment covered by this guide.

Service of your FISHER snowplow equipment is best performed by your local FISHER outlet. They know your snowplow best and are interested in your complete satisfaction.
Please become familiar with and make owners knowledgeable of the Warning and Instruction labels on the back of the blade!

WARNING
Indicates a potentially hazardous situation that, if not avoided, could result in death or serious personal injury.

CAUTION
Indicates a situation that, if not avoided, could result in minor personal injury and/or damage to product or property.

NOTE: Identifies tips, helpful hints and maintenance information the owner/operator should know.

BEFORE YOU BEGIN

WARNING
Lower blade when vehicle is parked. Temperature changes could change hydraulic pressure, causing the blade to drop unexpectedly or damaging hydraulic components. Failure to do this can result in serious personal injury.

Warning Label

Instruction Label
SAFETY INFORMATION

BEFORE YOU BEGIN

WARNING
Do not exceed GVWR or GAWR including blade and ballast. The rating label is found on the driver-side vehicle door corner post.

WARNING
Remove blade assembly before placing vehicle on hoist.

• Park the vehicle on a level surface, place shift lever in PARK or NEUTRAL and set parking brake.
• Leave the snowplow mounted on the vehicle and lowered for most service procedures, unless told otherwise.

PERSONAL SAFETY

• Wear only snug-fitting clothing while working on your vehicle or snowplow.
• Do not wear jewelry or a necktie, and secure long hair.
• Be especially careful near moving parts such as fan blades, pulleys and belts.

• Wear safety goggles to protect your eyes from battery acid, gasoline, dirt and dust.
• Avoid touching hot surfaces such as the engine, radiator, hoses and exhaust pipes.
• Always have a fire extinguisher handy, rated BC for flammable liquids and electrical fires.

VENTILATION

WARNING
Vehicle exhaust contains deadly carbon monoxide (CO) gas. Breathing this gas, even in low concentrations, could cause death. Never operate a vehicle in an enclosed area without venting exhaust to the outside.

If you work on the vehicle or snowplow in a garage or other enclosed area, be sure to vent exhaust gas directly to the outside through a leakproof exhaust hose.

FIRE AND EXPLOSION

WARNING
Gasoline is highly flammable and gasoline vapor is explosive. Never smoke while working on vehicle. Keep all open flames away from gasoline tank and lines. Wipe up any spilled gasoline immediately.

• If you suspect a hose leak, DO NOT use your hand to locate it. Use a piece of cardboard or wood.
• Always loosen plugs, fittings and valves slowly to bleed off any residual pressure.

BATTERY SAFETY

WARNING
Hydraulic oil under pressure could cause skin injection injury. If you are injured by hydraulic oil, get medical attention immediately.

HYDRAULIC SAFETY

• Always inspect hydraulic components and hoses before using. Replace any damaged or worn parts immediately.

CAUTION
Batteries normally produce explosive gases which can cause personal injury. Therefore, do not allow flames, sparks or lit tobacco to come near the battery. When charging or working near a battery, always cover your face and protect your eyes, and also provide ventilation.

Batteries contain sulfuric acid which burns skin, eyes and clothing.

Disconnect the battery before removing or replacing any electrical components.
**PRODUCT SPECIFICATIONS**

**Insta-Act® Hydraulic System**

**CAUTION**

Do not mix different types of hydraulic fluid. Some fluids are not compatible and may cause performance problems and product damage.

Hydraulic Oil

- FISHER® High Performance Fluid to -25°F (-32°C)

Fluid Capacity—Hydraulic Oil
- Unit Reservoir = 1-1/2 Quarts
- System Total = 2-1/4 Quarts

Solenoid Valve Spool Travel = 0.07" for three- and four-way valves (S2, S3). Travel of two-way valve (S1) spool is not detectable with voltage applied to coil.

**Electrical System – approximate values:**

- Solenoid Coil Resistance = 7 Ohms at room temperature
- Solenoid Coil Amp. Draw = 1.5 Amp.
- Motor Relay Coil Resistance = 16 - 17 Ohms
- Motor Amp. Draw = 0.7 Amp.
- Switched Accessory Lead Draw = 0.75 Amp

Vehicle Control Harness Fuse Size
- Park/ Turn – 15 Amp. (ATC)
- Control – 7.5 Amp. (ATC)

**Mechanical**

<table>
<thead>
<tr>
<th>Fastener Torque in IN–LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Cap Screws ........</td>
</tr>
<tr>
<td>Motor Terminal Nuts ....</td>
</tr>
<tr>
<td>Motor to Manifold Cap Screws</td>
</tr>
<tr>
<td>Reservoir Screws ..........</td>
</tr>
<tr>
<td>Valve Cartridges ........</td>
</tr>
<tr>
<td>Coil Nuts ..................</td>
</tr>
<tr>
<td>Cartridge / Coil Cover Screws</td>
</tr>
<tr>
<td>Check Valve ................</td>
</tr>
</tbody>
</table>

**CAUTION**

Do not mix different types of hydraulic fluid. Some fluids are not compatible and may cause performance problems and product damage.

**REQUIRED TOOLS**

**Electrical System –**

- Long Slender Needle Nose Pliers
- Flat Screwdriver
- Sockets and Combination Wrenches: 3/8" thru 7/8", 1-1/16", 1-1/8"
- Deep Socket: 7/8"
- 1/4" Socket or Nut Driver
- 12 V Test Light
- Torque Wrench (in-lb)
- Allen Wrench Set
- 3000 PSI Pressure Gauge with adapter fittings
- Flashlight
- Pick Set
- Hammer
- Digital Volt/Ohm Meter
- Pencil Magnet
- T-20 Torx

Available from your FISHER® outlet:
- Minute Mount® Electrical Tester
- Isolation Module Tester
- Removable Spring Tool (for replacing trip springs)
- Hydraulic Pressure Test Kit (Available late 2001)
HYDRAULIC HOSE ROUTING

- Lift Cylinder
- PS Angle Hose
- Passenger-Side (right) Angle Cylinder
- Lift Hose
- DS Angle Hose
- Driver-Side (left) Angle Cylinder
Solenoid Cartridge Valve—S1 (SV08-2004)
Solenoid Cartridge Valve—S2 (SV08-31)
Solenoid Cartridge Valve—S3 (SV08-40)
RELIEF VALVE IDENTIFICATION AND LOCATION

See page 47 for detail.
PILOT-OPERATED (POPPET TYPE) CHECK VALVE IDENTIFICATION AND LOCATION

See page 48 for detail.
OPERATING THE SNOWPLOW

Solenoid Control

**WARNING**
The driver shall keep bystanders clear of the blade when it is being raised, lowered or angled. Do not stand between the vehicle and the blade, or within 8 feet of a moving blade. A moving or falling blade could cause personal injury.

**CAUTION**
To prevent accidental movement of the blade, always turn the ON/OFF switch to OFF whenever the snowplow is not in use. The control indicator light will turn off.

**CAUTION**
DO NOT hold control lever in RAISE, ANGLE LEFT or ANGLE RIGHT position after blade has reached desired position. To do so could result in the hydraulic fluid overheating.

Mount the blade and attachments to the vehicle. Make the three electrical connections. Turn the vehicle ignition switch to the ON or the ACCESSORY position. Move control ON/OFF switch to the ON position. The control indicator light (red) should light whenever the control ON/OFF switch and the ignition (key) are both turned ON.

<table>
<thead>
<tr>
<th>Action</th>
<th>Description of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON/OFF</td>
<td>Slide the control power switch to ON to activate the hydraulic system. Turn the control OFF to lock the blade in place. This prevents accidental movement of the blade.</td>
</tr>
<tr>
<td>Raise</td>
<td>Move the control lever up (forward) to raise the blade to the desired height.</td>
</tr>
<tr>
<td>Lower/Float</td>
<td>Move the control lever down (back) to lower the blade and activate the FLOAT mode.</td>
</tr>
<tr>
<td>Right</td>
<td>Move the control lever right to angle the blade to the right.</td>
</tr>
<tr>
<td>Left</td>
<td>Move the control lever left to angle the blade to the left.</td>
</tr>
<tr>
<td>Cancel Float</td>
<td>Cancel the FLOAT mode by momentarily placing the control in the RAISE position, turning the control off, or turning the vehicle ignition off. Angling left or right does not cancel float.</td>
</tr>
</tbody>
</table>

Turn the vehicle ignition switch on. Turn the control on. The control indicator light should be on.
OPERATING THE SNOWPLOW

Fish-Stik® Hand-Held Control

1. Turn the vehicle ignition switch to the ON or the ACCESSORY position. The control logo area illuminates.

2. Press the ON/OFF button on the control. The control indicator light glows red indicating the control is on. The control indicator light glows red whenever the control ON/OFF switch and the vehicle ignition switch are both ON.

3. Press the LOWER button for 0.75 seconds to engage the FLOAT mode. The control indicator FLOAT light glows green. Cancel the FLOAT mode by momentarily pressing the RAISE button.

Function Time Outs

All control functions, except for LOWER, automatically time out—stop—after a period of time. This helps prolong the battery charge. The time-out period for the RAISE function is 4.8 seconds, while the angle function is 9.6 seconds.

The control automatically turns off after being idle for 20 minutes.

Smooth Stop

The control automatically allows the blade to coast to a stop. This results in smoother operation, reduces the shock to the hydraulic system and increases hose and valve life.

<table>
<thead>
<tr>
<th>Button</th>
<th>Description of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raise</td>
<td>Press this button to raise the snowplow and to cancel the float mode. NOTE: Snowplow automatically stops raising after 4.8 seconds. To resume raising the snowplow, release the button and press again.</td>
</tr>
<tr>
<td>Lower/Float</td>
<td>Press this button to lower the snowplow. NOTE: After reaching the desired height, release the button. Holding the button down for more than 0.75 seconds activates the float mode, indicated by green FLOAT lamp.</td>
</tr>
<tr>
<td>Right</td>
<td>Press this button to angle blade to the right.</td>
</tr>
<tr>
<td>Left</td>
<td>Press this button to angle blade to the left.</td>
</tr>
<tr>
<td>Cancel Float</td>
<td>Cancel the float mode by momentarily pressing and releasing the RAISE button, turning control off, or turning vehicle ignition off. Angling left or right momentarily cancels float.</td>
</tr>
</tbody>
</table>
THEORY OF OPERATION

Snowplow Headlamps

The Isolation Module acts as an electrical hub, automatically directing vehicle power to the appropriate vehicle or snowplow lighting devices, while also supplying battery power to the snowplow control.

The vehicle high and low beams enter and exit the Isolation Module through positions 3 (left side lighting) and position 4 (right side lighting). Park, turn, and DRL signals also enter through positions 3 and 4.

The output of the vehicle dimmer switch is directed to the Isolation Module via the long and short plug-in harnesses. When the snowplow is not attached to the vehicle, the signal passes through the normally closed relay contacts to the vehicle headlamps. During this time, the Isolation Module is inactive, placing no current draw on the vehicle’s electrical system.

With the snowplow attached, the Isolation Module is still inactive until either of the two following conditions are met: the vehicle parking lights are turned on or the vehicle ignition switch is turned on.

Turning on the vehicle parking lights activates a series of relays, automatically transferring the vehicle high and low beams to the snowplow while supplying battery power directly to the snowplow parking lights. All snowplow lighting exits the Isolation Module through position 2.

Turning on the vehicle ignition switch energizes a snowplow control relay, supplying vehicle battery power directly to the control via the vehicle control harness. The vehicle ignition switch also supplies power to the vehicle turn signals. Activating the vehicle turn signals energizes turn signal relays, which supply vehicle battery power directly to the snowplow turn signals.

Snowplow Daytime Running Lamps

Because Daytime Running Lamps (DRLs) are controlled differently on some vehicles, two Isolation Modules have been developed.

The standard Isolation Module transfers the DRL output from the vehicle headlamps to the snowplow lights when the vehicle ignition switch is on and the snowplow is attached.

The Isolation Module designed for the 1999-20_ GMC All New Sierra and 1999-20_ Chevy Silverado senses the vehicle in the DRL mode. A series of relays energize, placing the snowplow headlamps in the DRL mode. This Isolation Module does not turn off the dedicated vehicle DRLs.
Snowplow Hydraulics

The snowplow hydraulic system performs four blade movements: RAISE, LOWER, ANGLE RIGHT, AND ANGLE LEFT.

All four movements require the vehicle ignition (key) switch to be in the run or accessory position and the cab control to be turned on.

Three hydraulic movements require energizing the electric motor, shifting solenoid cartridge valve(s) or activating check valves. The fourth function, LOWER, does not energize the motor but shifts a solenoid cartridge valve.

Power to the three solenoid cartridge valves is supplied by the vehicle battery, via the Isolation Module and cab control. The three solenoid cartridge valves operate in various combinations, electrically activated by the cab control, to send hydraulic fluid to the snowplow lift and angle cylinders or back to the reservoir.
This section contains hydraulic and electrical schematics to help explain how the hydraulic unit performs the different functions. A schematic is an abstract drawing showing the purpose of each component in the system. Each component is represented by a graphical symbol. The hydraulic and electrical legends describe each symbol used in the schematics for this guide.

The first two schematics show an overview of the complete hydraulic and electrical systems. Other schematics highlight the flow of hydraulic oil and electrical current for each function the hydraulic unit performs as well as the flow of electrical current for the snowplow and vehicle lights.

- Bold lines and gray lines (ground) represent the circuit being activated only.
- Shaded components are either activated or shifted from their normal position.

**NOTE:** Left side = Driver side  
Right side = Passenger side

### Wire Color Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLK</td>
<td>Black</td>
</tr>
<tr>
<td>BLK/ORN</td>
<td>Black w/ Orange</td>
</tr>
<tr>
<td>BLK/RED</td>
<td>Black w/ Red</td>
</tr>
<tr>
<td>BLK/WHT</td>
<td>Black w/ White</td>
</tr>
<tr>
<td>BLU</td>
<td>Blue</td>
</tr>
<tr>
<td>BLU/ORN</td>
<td>Blue w/ Orange</td>
</tr>
<tr>
<td>BRN</td>
<td>Brown</td>
</tr>
<tr>
<td>BRN/GRN</td>
<td>Brown w/ Green</td>
</tr>
<tr>
<td>BRN/RED</td>
<td>Brown w/ Red</td>
</tr>
<tr>
<td>GRN</td>
<td>Green</td>
</tr>
<tr>
<td>GRY</td>
<td>Gray</td>
</tr>
<tr>
<td>LTBLU</td>
<td>Light Blue</td>
</tr>
<tr>
<td>LTGRN</td>
<td>Light Green</td>
</tr>
<tr>
<td>ORN</td>
<td>Orange</td>
</tr>
<tr>
<td>PNK</td>
<td>Pink</td>
</tr>
<tr>
<td>PUR</td>
<td>Purple</td>
</tr>
<tr>
<td>RED</td>
<td>Red</td>
</tr>
<tr>
<td>RED/GRN</td>
<td>Red w/ Green</td>
</tr>
<tr>
<td>WHT</td>
<td>White</td>
</tr>
<tr>
<td>WHT/YEL</td>
<td>White w/ Yellow</td>
</tr>
<tr>
<td>YEL</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORL</td>
<td>Daytime Running Lamps</td>
</tr>
<tr>
<td>MTR RLY</td>
<td>Motor Relay</td>
</tr>
<tr>
<td>PIT SIG</td>
<td>Park / Turn Signal</td>
</tr>
</tbody>
</table>
HYDRAULIC SCHEMATIC

<table>
<thead>
<tr>
<th>BLADE MOVEMENT</th>
<th>RAISE</th>
<th>LOWER</th>
<th>ANGLE RIGHT</th>
<th>ANGLE LEFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR</td>
<td>M</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>SV08-2004</td>
<td>S1</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>SV08-31</td>
<td>S2</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>SV08-40</td>
<td>S3</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>
RAISE – ELECTRICAL

Blade Movement: Raise
Control: Raise
System Response:

1) By moving control lever or pressing the control button, the circuit board within the cab control switches power to the electrical circuits.

2) Motor relay closes, current flows through the motor relay, activating the pump motor. +12V is applied to the coil of solenoid cartridge valve S3, shifting the spool.

3) Hydraulic oil from the pump flows through solenoid cartridge valves S3 & S2, through the internal check valve in solenoid cartridge valve S1 into the base end of the lift cylinder causing it to extend.
**Blade Movement:** Lower / Float  
**Control:** Lower  
**System Response:**

1) By moving control lever or pressing the control button, the circuit board within the cab control switches power to the electrical circuits.

2) +12V is applied to the coil of solenoid cartridge valve S1, shifting the spool.

3) The weight of the plow forces the lift cylinder to retract. The retracting lift cylinder pushes the hydraulic oil out of its base end, through solenoid cartridge valves S1 & S2 & S3, and back to the reservoir.

**NOTE:** Angling left or right using the Fish-Stik® handheld control momentarily cancels Float while the button is depressed. Float is not cancelled by angling when using the solenoid control.
 Blade Movement: Angle Right
Control: Right

System Response:
1) By moving control lever or pressing the control button, the circuit board within the cab control switches power to the electrical circuits.

2) Motor relay closes, current flows through the motor relay, activating the pump motor. +12V is applied to the coil of solenoid cartridge valve S2, shifting its spool.

3) Hydraulic oil from the pump flows through solenoid cartridge valve S3, P/O check valve and into the base end of the left cylinder causing it to extend.

4) The retracting right cylinder pushes the hydraulic oil out of its base end, through solenoid cartridge valves S2 & S3 back to the reservoir.
Blade Movement: Angle Left

Control: Left

System Response:

1) By moving control lever or pressing the control button, the circuit board within the cab control switches power to the electrical circuits.

2) Motor relay closes, current flows through the motor relay, activating the pump motor. +12V is applied to the coil of solenoid cartridge valves S2 & S3, shifting both spools.

3) Hydraulic oil from the pump flows through solenoid cartridge valves S3 & S2 and into the base end of the right cylinder causing it to extend.

4) Pressure within the hydraulic circuit causes the P/O check valve to open.

5) The retracting left cylinder pushes the hydraulic oil out of its base end, through the open P/O check valve and solenoid cartridge valve S3 and back to the reservoir.
HOLD IN RAISE POSITION – HYDRAULIC

Blade Movement: Striking an Object While Plowing

Control: None

System Response:

1) Hydraulic oil is trapped in the base end of the lift cylinder by the internal check valve in solenoid cartridge valve S1.

2) When the snowplow contacts an object, the force of the impact increases the hydraulic pressure in the base end of the cylinder. When the pressure exceeds the relief valve pressure setting, the relief valve opens allowing oil to flow to the base of the opposite cylinder.
**Blade Movement:** Striking an Object While Plowing

**Control:** None

**System Response:**

1) Hydraulic oil is trapped in the base end of the cylinders by the relief valves, the P/O check valve and solenoid cartridge valve S2.

2) When the snowplow contacts an object, the force of the impact increases the hydraulic pressure in the base end of the cylinder. When the pressure exceeds the relief valve pressure setting, the relief valve opens allowing oil to flow to the base of the opposite cylinder.
**Blade Movement:** Striking an Object While Plowing

**Control:** None

**System Response:**

1) Hydraulic oil is trapped in the base end of the cylinders by the relief valves, the P/O check valve and solenoid cartridge valve S2.

2) When the snowplow contacts an object, the force of the impact increases the hydraulic pressure in the base end of the cylinder. When the pressure exceeds the relief valve pressure setting, the relief valve opens allowing oil to flow to the base of the opposite cylinder.
Introduction

This guide consists of a series of tables, diagrams, flowcharts and other information. When used properly it helps the mechanic to identify and repair faulty system components. Fisher Engineering recommends using the Electrical Tester as a timesaving tool for electrical system diagnosis. When using this tester, refer to the supplied instruction manual.

All malfunctions of the snowplow can be categorized as mechanical, electrical, or hydraulic. Mechanical issues are generally related to the blade or attachments and can usually be identified by visual inspection. However, electrical and hydraulic issues can be difficult to trace to the component level and that is the purpose of this troubleshooting guide.

How to Use the Troubleshooting Guide

When diagnosing the snowplow electrical and hydraulic systems, some conditions must be eliminated in order to develop valid tests. These conditions are listed before the tables or flowcharts and must be satisfied before proceeding.

If the listed conditions are not met, the procedure can result in inaccurate results and wasted time.

In many cases, satisfying the listed conditions alone solves the problem.

1. Go to the General Diagnostic Table and satisfy the nine listed conditions. These conditions must be met before proceeding into the table or to any subsequent test.

2. Locate the condition in the table which best describes the problem and check possible causes and actions in the order listed.

3. Proceed to a service procedure, another condition, or a specific test as directed. All tests except the Hydraulic System Test use a flowchart format. To use these flowcharts, first satisfy any listed conditions at the top of the page. Then begin at the upper left square and proceed as directed.

4. Follow along sequentially through the table and tests, referring to the hydraulic and electrical schematics in the Theory of Operation section and the component Identification and Location diagrams. Eventually the problem is identified at the component level.

Electrical Testing

Read and understand the Theory of Operation before attempting troubleshooting.

Read and understand the Theory of Operation before attempting troubleshooting.

Read and understand the Theory of Operation before attempting troubleshooting.
GENERAL DIAGNOSTIC TABLE

BEFORE USING THIS GENERAL DIAGNOSTIC TABLE, OR PERFORMING ANY TESTS, YOU MUST VERIFY THE FOLLOWING CONDITIONS:

1. Snowplow is attached to vehicle and all harnesses are connected.
2. Harness connector pins and terminals are free of corrosion, ensuring good connections, and coated with dielectric grease.
3. Vehicle battery and charging system are in good condition and battery connections are clean and tight.
4. Hydraulic reservoir is filled to fill plug level with recommended fluid when lift cylinder is fully retracted. See Product Specifications.
5. No oil leaks from hoses, fittings, cylinders or the hydraulic unit.
6. All built up snow and ice is removed from the snowplow.
7. FISHER® vehicle control harness fuses are good.
8. Ignition is turned on or engine is running.
9. The control is connected in the cab and turned on.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor does not run for any requested function.</td>
<td>Poor connection of vehicle’s or plow’s battery cable.</td>
<td>Tighten and/or clean connections.</td>
</tr>
<tr>
<td>Motor relay inoperative.</td>
<td>Go to Motor Relay Test.</td>
<td></td>
</tr>
<tr>
<td>Defective control.</td>
<td>Go to Control Test.</td>
<td></td>
</tr>
<tr>
<td>Fault in vehicle control harness.</td>
<td>Go to Vehicle Control Harness Test.</td>
<td></td>
</tr>
<tr>
<td>Motor worn or damaged or pump seized.</td>
<td>Go to Motor Test.</td>
<td></td>
</tr>
<tr>
<td>Motor runs continuously.</td>
<td>Motor relay sticking or always energized.</td>
<td>Go to Motor Relay Test.</td>
</tr>
<tr>
<td>Defective control.</td>
<td>Go to Control Test.</td>
<td></td>
</tr>
<tr>
<td>Fault in vehicle control harness.</td>
<td>Go to Vehicle Control Test.</td>
<td></td>
</tr>
<tr>
<td>Snowplow won’t raise—motor runs.</td>
<td>Lift cylinder packing nut too tight.</td>
<td>Adjust lift cylinder packing nut.</td>
</tr>
<tr>
<td>Clogged pump filter (all functions are affected). *</td>
<td>Clean or replace filter, flush reservoir.</td>
<td></td>
</tr>
<tr>
<td>Worn or damaged pump.</td>
<td>Go to Pump Pressure Test.</td>
<td></td>
</tr>
</tbody>
</table>

* Thread sealant/tape is not compatible with hydraulics.
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowplow won’t raise—motor runs.</td>
<td>Solenoid valve coils not energizing properly.</td>
<td>Go to Cartridge Coil Activation Test.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic system malfunction. *</td>
<td>Go to Hydraulic System Test.</td>
</tr>
<tr>
<td></td>
<td>Defective control.</td>
<td>Go to Control Test.</td>
</tr>
<tr>
<td>Snowplow raises slowly or partially—motor runs.</td>
<td>Poor connection of vehicle’s or plow’s cables.</td>
<td>Clean and re-attach all connections.</td>
</tr>
<tr>
<td></td>
<td>Clogged pump filter (all functions are affected). *</td>
<td>Clean or replace filter, flush reservoir.</td>
</tr>
<tr>
<td></td>
<td>Worn or damaged pump.</td>
<td>Go to Pump Pressure Test.</td>
</tr>
<tr>
<td>Snowplow will not lower or lowers slowly, or won’t float.</td>
<td>Lift cylinder packing nut too tight.</td>
<td>Adjust lift cylinder packing nut.</td>
</tr>
<tr>
<td></td>
<td>Solenoid valve coils not activating properly.</td>
<td>Go to Cartridge Coil Activation Test.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic system malfunction. *</td>
<td>Go to Hydraulic System Test.</td>
</tr>
<tr>
<td></td>
<td>Defective control.</td>
<td>Go to Control Test.</td>
</tr>
<tr>
<td>Snowplow lowers by itself or won’t stay in raised position.</td>
<td>Hydraulic system malfunction. *</td>
<td>Go to Hydraulic System Test.</td>
</tr>
<tr>
<td></td>
<td>Defective control.</td>
<td>Go to Control Test.</td>
</tr>
<tr>
<td>Blade will not hold angled position.</td>
<td>Air in angle cylinders.</td>
<td>Cycle angle functions to purge cylinders.</td>
</tr>
<tr>
<td></td>
<td>Oil bypassing crossover relief valve.</td>
<td>Go to Relief Valve Inspection and Adjustment.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic system malfunction. *</td>
<td>Go to Hydraulic System Test.</td>
</tr>
<tr>
<td>Snowplow does not perform the selected function or performs a different function.</td>
<td>Hydraulic hose routing incorrect.</td>
<td>Verify correct hose installation. See Hose Routing Diagram.</td>
</tr>
<tr>
<td></td>
<td>Solenoid valve coils not energizing properly.</td>
<td>Go to Cartridge Coil Activation Test.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic system malfunction. *</td>
<td>Go to Hydraulic System Test.</td>
</tr>
<tr>
<td></td>
<td>Defective control.</td>
<td>Go to Control Test.</td>
</tr>
</tbody>
</table>

* Thread sealant/tape is not compatible with hydraulics.
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FISHER® vehicle control harness control fuse blows.</td>
<td>Red wire in vehicle harness is shorted to ground.</td>
<td>Repair wire or replace vehicle harness.</td>
</tr>
<tr>
<td></td>
<td>Motor relay primary coil shorted internally.</td>
<td>Check primary coil with ohmmeter. Replace defective motor relay.</td>
</tr>
<tr>
<td></td>
<td>Solenoid valve coil shorted internally.</td>
<td>Go to Individual Solenoid Coil Test. Replace shorted coils.</td>
</tr>
<tr>
<td></td>
<td>Motor relay or solenoid coil wires in vehicle harness shorted to ground.</td>
<td>Repair wire or replace vehicle harness.</td>
</tr>
<tr>
<td></td>
<td>Solenoid coil wires in snowplow harness shorted to ground.</td>
<td>Repair wire or replace snowplow harness.</td>
</tr>
<tr>
<td></td>
<td>Defective control.</td>
<td>Go to Control Test.</td>
</tr>
<tr>
<td>Excessive load on vehicle electrical system while using snowplow.</td>
<td>Pump Relief incorrectly adjusted.</td>
<td>Go to Pump Pressure Test.</td>
</tr>
<tr>
<td></td>
<td>Worn or damaged motor or pump.</td>
<td>Go to Pump Pressure Test.</td>
</tr>
<tr>
<td></td>
<td>Poor connection of battery cables.</td>
<td>Inspect battery cables, clean and re-establish all battery connections.</td>
</tr>
<tr>
<td>Snowplow headlamps operate irregularly or not at all—snowplow attached.</td>
<td>Burned out bulbs or corroded sockets.</td>
<td>Replace bulbs, clean contacts.</td>
</tr>
<tr>
<td></td>
<td>Wires improperly located in connector inserted into Isolation Module.</td>
<td>Review and correct wire installation. Go to Snowplow Headlamp Test.</td>
</tr>
<tr>
<td></td>
<td>Isolation Module improperly connected.</td>
<td>Go to Isolation Module Test.</td>
</tr>
<tr>
<td>Vehicle daytime running lamps (DRLs) do not work.</td>
<td>Parking brake on, vehicle not in drive. Light sensor not deactivated.</td>
<td>Fully release parking brake, place vehicle in drive. Place light by sensor.</td>
</tr>
<tr>
<td></td>
<td>Power in DRL circuit has been interrupted.</td>
<td>Turn lamp and/or ignition switch on and off to cycle the DRL circuitry. Go to Vehicle DRL Test.</td>
</tr>
<tr>
<td>Snowplow DRLs do not work.</td>
<td>Power in DRL circuit has been interrupted.</td>
<td>Go to Snowplow DRL Test.</td>
</tr>
<tr>
<td>Blade will not hold position.</td>
<td>Hydraulic system malfunction.</td>
<td>Go to Hydraulic System Test.</td>
</tr>
</tbody>
</table>
**Cylinder with Packing Nut**

If equipped with this type of cylinder, periodically verify the lift or angle cylinder packing nuts have not loosened. If a packing nut is loose or leakage appears when activating the cylinder, tighten the packing nut 1/4-turn after you feel the packing nut contact the packing.

If adjustment fails to stop fluid loss, replacement of packing and/or rod (if the chromed surface is pitted) may be required.

---

**CAUTION**

Do not overtighten the packing nut. Overtightening affects the operation and life of the packing.

---

**NOTE:** A small amount of leakage is acceptable to properly lubricate the rod.

---

**Low Friction Cylinder**

If equipped with this type of lift or angle cylinder, the gland nut is torqued to 150-180 ft-lbs at the factory. Fluid leakage past the internal seal to the outside indicates a bad seal and/or that chromed rod is pitted. Replacement of the damaged parts is required.
**WARNING**

The driver shall keep bystanders clear of the blade during this test. Do not stand between the vehicle and the blade. A moving or falling blade could cause personal injury.

**MOTOR TEST**

Refer to the Motor and Motor Relay Test Diagram.

To activate the motor, the following conditions must be met:

1. All three (3) snowplow and vehicle harnesses and cable assemblies must be connected.
2. The vehicle control harness is plugged into position 1 of the Isolation Module.
3. The vehicle lighting harness is plugged into position 2 of the Isolation Module.
4. +12V from the battery must be connected to one secondary terminal of the motor relay.
5. The vehicle ignition switch must be in the ON position.
6. The control must be turned on.

**MOTOR DOES NOT RUN**

- Are snowplow and vehicle harnesses properly connected?
  - YES
  - NO

  - Connect the snowplow and vehicle harnesses and cable assemblies.

- Are motor connections correct (black/red stripe to positive terminal and black to negative terminal)?
  - YES
  - NO

  - Correct the motor connections.

- When the control is activated (raise, left, or right) is 12 volts on the positive motor terminal?
  - YES
  - NO

  - When the control is activated, is 12 volts on the switched terminal of the motor relay?
    - YES
    - NO

- Is the vehicle cable assembly black wire connected to the negative battery terminal?
  - YES
  - NO

  - Connect to negative battery terminal.

  - NO

  - Replace the motor relay.

- Go to Motor Relay Test.

**MOTOR RUNS CONTINUOUSLY**

- Disconnect the brown/red stripe from the motor relay primary terminal. Does motor stop?
  - YES
  - NO

  - Go to the Control Test.

- Replace the motor relay.
**MOTOR RELAY TEST**

**WARNING**
The driver shall keep bystanders clear of the blade during this test. Do not stand between the vehicle and the blade. A moving or falling blade could cause personal injury.

1. Momentarily jump power and ground directly from battery to motor to verify that the motor runs. Make final connection at the motor.

2. Refer to the Motor and Motor Relay Test Diagram, and Vehicle Harness and Vehicle Cable Location Diagram.

---

**Motor does not run**

- Momentarily attach a jumper cable across the motor relay secondary terminals. Does motor run?

  - **NO**
    - Repair or replace red (+) cable from battery to motor relay.

  - **YES**
    - Attach a jumper wire from battery (+) to motor relay primary terminal with brown/red wire. Does motor run?

      - **NO**
        - Go to Vehicle Harness Test - Motor Relay. If OK, go to Control Test.

      - **YES**
        - Leave (+) jumper wire attached and attach a ground jumper wire from battery (-) to relay primary terminal with black/orange or orange/black wire. Does motor run?

          - **NO**
            - Replace motor relay.

          - **YES**
            - Repair or replace orange/black wire between motor relay and battery (-).

**Motor runs continuously**

- Disconnect brown/red wire from motor relay primary terminal. Does the motor stop?

  - **NO**
    - Replace motor relay.

  - **YES**
    - Verify correct polarity of cables from battery to motor.

      - **NO**
        - Reverse leads or replace cable if manufactured incorrectly.

      - **YES**
        - Go to Control Test.
VEHICLE CONTROL HARNESS TEST

**WARNING**

The driver shall keep bystanders clear of the blade during this test. Do not stand between the vehicle and the blade. A moving or falling blade could cause personal injury.

Perform the Motor Test and Motor Relay Test first.

To check the Vehicle Control Harness, the following conditions must be met:

1. The snowplow and vehicle lighting harnesses must be connected.

   **Yes**

   Is socket #3 of the control plug grounded?

   **Yes**

   Is socket #3 of the control plug grounded?

   **No**

   Yes

   NO

   Check for a blown fuse or a faulty connection on the unswitched terminal of the motor relay.

   **No**

   Is 12 volts present on both sides of the control fuse?

   **Yes**

   **Yes**

   With the ignition switch in the ON position, are there 12 volts on pos. C of the #1 connector of the Isolation Module?

   **Yes**

   Are vehicle cable assembly and vehicle control harness grounds connected?

   **Yes**

   Perform Control Test.

   **No**

   **No**

   Connect the grounds.

   **Yes**

   Check switched accessory lead connection.

   **Yes**

   Using the Isolation Module Tester, perform the Isolation Module Test

2. The vehicle control harness is plugged into position 1 of the Isolation Module.

3. The vehicle lighting harness is plugged into position 2 of the Isolation Module.

4. **Disconnect** the control in the cab.

5. The vehicle ignition switch must be in the ON position.

6. Refer to the 6-pin Connector diagram. Test the vehicle side of the connector in the cab as follows.

   White 6-Pin Connector on vehicle control harness (located in cab)

   3 6

   2 5

   1 4

   Socket end view
VEHICLE CONTROL HARNESS TEST

Motor Relay Will Not Activate

- **Is control power LED on?**
  - **YES** → When control is activated (raise, left, or right) is 12 volts on the motor relay primary terminal (the brown/red wire)?
    - **YES** → Is ground on the second motor relay primary terminal (the black/orange wire)?
      - **YES** → Perform Motor Relay Test.
      - **NO** → Go to Control Test.
  - **NO**

- **Is 7.5-Amp control fuse blown?**
  - **YES** → Replace the fuse.
  - **NO**

- **Do park/turn lights function on snowplow?**
  - **YES** → Using the Isolation Module Tester, perform the Isolation Module Test.
  - **NO** → Connect the grounds.

- **Are vehicle cable assembly and vehicle control harness grounds connected?**
  - **YES** →
  - **NO** → Connect the grounds.
CONTROL TEST

Fish-Stik® Hand-held Control or Joystick Solenoid Control

1. Disconnect the control in the cab and remove to work bench.

2. Perform the Cab Control Test using the Minute Mount® Electrical Tester.

To Safely Handle Hand-Held PCB:

⚠️ CAUTION
Printed circuit board (PCB) is subject to damage from static electricity. Follow instructions below to safely handle PCB.

1. Disconnect the control in the cab and remove to a workbench.

2. Place control on its left side and remove right side of handle, leaving the keypad/circuit board assembly in left half.

3. Touch any grounded metal object to discharge possible static buildup.

4. Remove keypad/circuit board assembly from housing by only touching the edges of the keypad/circuit board assembly.

5. The keypad/circuit board assembly can be handled safely as long as contact with it is maintained.

Do outputs match results of Cab Control Test from Minute Mount® Electrical Tester?

Control is OK. Verify vehicle control harness ground and power source for red wire.

Solenoid Control:
Replace PCB or control assembly.

Hand-Held Control:
Follow handling instructions. Remove handle half. Is the white cord connector fully seated on the PCB?

Replace control or proceed by carefully disconnecting white cord connector from PCB. Test the cord for continuity according to electrical schematics. Note internal connection in the cord. Does continuity match schematic?

Replace PCB.

Seal cord connector fully on the PCB. Retest Control.

Replace coil cord.
1. Check fluid level.

2. Lower blade to the ground to remove any pressure from the lift cylinder.

3. Carefully disconnect the hose for the base end of the lift cylinder at the valve manifold block.

4. Using a suitable adapter fitting, attach a 3000 psi pressure gauge to the valve block fitting.

5. Activate the raise function with the control and read the pump relief pressure. The chart lists relief valve settings.

**WARNING**

The tester shall keep bystanders clear of the blade during this test. Do not stand between vehicle and the blade. A moving or falling blade could cause personal injury.

---

### Snowplow Type

<table>
<thead>
<tr>
<th>Relief Valve</th>
<th>Pump Relief Pressure PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. turns out from fully seated</td>
<td>± 100 PSI</td>
</tr>
</tbody>
</table>

- **All Straight Blades**
  - 2½ – 2¾
  - 1750

---

**Checklist**

- Does pump relief pressure match value on chart? **NO →** Is the pressure zero? **NO →** Adjust pump relief clockwise 1/8 turn to increase pressure. Did pressure change? **NO →** Inspect pump relief valve for damaged components or contamination. Is pump relief valve good? See pg. 47 **NO →** Replace Relief Valve and Adjust. **YES →** Inspect pump relief valve for damaged components or contamination. Is pump relief valve good? See pg. 47 **YES →** Replace pump.

- Is motor amp draw greater than 190 amps when pump is on relief? **NO →** Is motor amp draw greater than 190 amps when pump is on relief? **YES →** Repair or replace motor. **NO →** Go to Hydraulic System Test.

- Remove reservoir. Inspect pickup tube and filter. Suction side OK? **NO →** Repair or replace motor. **YES →** Adjust to chart value.

- Remove and inspect pump **NO →** Replace pump o-ring. Reassemble and adjust pressure **YES →** Remove pump. Is pump O-ring damaged? **NO →** Replace pump. **YES →** Replace pump o-ring. Reassemble and adjust pressure

---

**WARNING**

The tester shall keep bystanders clear of the blade during this test. Do not stand between vehicle and the blade. A moving or falling blade could cause personal injury.
CARTRIDGE COIL ACTIVATION TEST

1. Disconnect the red (+) battery cable from the motor and isolate it.

2. Remove solenoid valve cover.

3. Verify wires are properly attached to solenoid coils. Refer to Electrical Schematic and Solenoid Cartridge Valve Identification and Location Table at top right of this page.

4. Activate the control for each function and check for magnetic pull at all three solenoid valve coils using common screwdriver. Only the coils designated as "ON" in the table below should activate for each function. After noting which coils are energized, proceed to the flow chart.

   **Table:**
<table>
<thead>
<tr>
<th>Solenoid Coil</th>
<th>Vehicle Control Harness Socket</th>
<th>Wire Color</th>
<th>Raise</th>
<th>Lower</th>
<th>Angle Right</th>
<th>Angle Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>9</td>
<td>White/ Yellow</td>
<td>*</td>
<td>ON</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>S2</td>
<td>4</td>
<td>Light Green</td>
<td>*</td>
<td>ON</td>
<td>*</td>
<td>ON</td>
</tr>
<tr>
<td>S3</td>
<td>3</td>
<td>Light Blue</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

* S1 output is "ON" for all functions if control is in "FLOAT". Press "RAISE" button to cancel "FLOAT".

Fish-Stik® Hand-Held Control Only – While in "FLOAT", pressing and holding the “RIGHT” or “LEFT” button turns off solenoid cartridge valve S1 until the button is released.

- Do activated coils match the chart for all functions?
  - YES: Go to Hydraulic System Test.
  - NO: Verify battery cables are connected. Is ground at all black/orange wires attached to coils?
    - YES: Using Minute Mount® Electrical Tester, perform the Snowplow Harness Test.
    - NO: Repair black/orange wires to coils, check ground connections at motor, battery cable connector and battery (-) terminal. Retest.
This test consists of trying all the snowplow functions and comparing the snowplow reaction to the action requested in the following table. The table will pinpoint faulty solenoid valves or p/o check valve accurately if only one component is malfunctioning. If the snowplow reaction for a given function is not listed in the table, there may be a relief or p/o check valve which is stuck open or contaminated, missing or damaged o-rings or backing rings on cartridge, relief or p/o check valve, or there may be two or more faulty components. In this case, use the specific function hydraulic schematic and carefully inspect each component in the flow circuit. If contamination is evident in more than one component, the hydraulic unit, hoses and cylinders must be completely disassembled, inspected and cleaned.

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1. Perform Cartridge Coil Activation Test first.
2. Verify hydraulic hose installation is correct. Refer to the Hydraulic Hose Routing diagram.
3. Test all snowplow functions.
4. Inspect and clean or replace the suspected component. Refer to the Hydraulic Unit Parts Diagram.
5. Refer to the sections following the table for inspecting and adjusting solenoid cartridge valves, p/o check valve, and relief valves.

IMPORTANT: When testing the snowplow functions, be sure the control is not in “float.”

<table>
<thead>
<tr>
<th>ACTION REQUESTED</th>
<th>PLOW REACTION</th>
<th>POSSIBLE CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raise</td>
<td>None</td>
<td>S3 not shifted</td>
</tr>
<tr>
<td></td>
<td>Angle Left</td>
<td>S2 stuck shifted</td>
</tr>
<tr>
<td>Lower</td>
<td>None</td>
<td>S1 not shifted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2 stuck shifted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S3 stuck shifted</td>
</tr>
<tr>
<td>Angle Right</td>
<td>Angle Left</td>
<td>S3 stuck shifted</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>S2 not shifted</td>
</tr>
<tr>
<td></td>
<td>Slow</td>
<td>Poppet check valve not opening</td>
</tr>
<tr>
<td>Angle Left</td>
<td>Angle Right</td>
<td>S3 not shifted</td>
</tr>
<tr>
<td></td>
<td>Raise</td>
<td>S2 not shifted</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>S2 and S3 not shifted</td>
</tr>
<tr>
<td></td>
<td>Slow</td>
<td>Poppet check valve not opening</td>
</tr>
<tr>
<td>None (blade raised)</td>
<td>Lowers</td>
<td>S1 stuck shifted or has leaking internal check valve</td>
</tr>
<tr>
<td>None</td>
<td>Drifts Right</td>
<td>S2 stuck shifted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contamination, bad valve stem seat, or damaged O-rings in crossover relief valve</td>
</tr>
<tr>
<td></td>
<td>Drifts Left</td>
<td>Poppet check valve open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contamination, bad valve stem seat, or damaged O-rings in crossover relief valve</td>
</tr>
</tbody>
</table>
Relief Valve Inspection

1. Remove the valve stem, ball, spacer and spring.
2. Look for broken or damaged parts, contamination or missing or damaged O-rings.

Adjustment

1. Adjust by tightening the relief valve stem until it bottoms out (until spring is fully compressed).
2. Back off valve stem (rotate counterclockwise) the number of turns indicated in the chart.

Hydraulic System

<table>
<thead>
<tr>
<th>Relief Valve</th>
<th>No. of Turns Backed Off (CCW) From Fully Seated</th>
<th>Approximate Relief Valve Pressure ± 100 (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Relief *</td>
<td>2½ – 2¾</td>
<td>1750</td>
</tr>
<tr>
<td>Angle Cylinder Crossover Relief</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular (RD &amp; HD)</td>
<td>1¼ – 1½</td>
<td>4000</td>
</tr>
<tr>
<td>Commercial (MC)</td>
<td>2¼ – 2½</td>
<td>2500</td>
</tr>
<tr>
<td>LD</td>
<td>2¼ – 2½</td>
<td>2500</td>
</tr>
</tbody>
</table>

* See Pump Pressure Test to measure actual pump relief pressure.

CAUTION
Be careful to strike stem squarely. You can bend stem if you do not strike it squarely.

3. If parts are in good condition, place ball on hard wood block, hold stem seat on ball and lightly strike top of stem with a hammer. This seats the ball and valve stem.
4. Apply a light coat of anti-seize or grease to stem threads. Lubricate O-rings with hydraulic fluid. Reassemble components into valve block.
1. Strike boss plugs squarely with a hammer to facilitate removal.

2. Remove O-ring boss plug, spring and poppet.

3. Remove O-ring boss plug, spring and spool with O-ring. Use long/slender needle-nosed pliers to remove spool.

4. Inspect springs, poppet, spool, O-rings and poppet seat for wear, damage or contamination.

5. If the valve manifold block has a steel poppet seat, use a strong pencil magnet to push and pull on the seat. If the seat moves at all, replace the valve block.

6. Re-oil O-rings, install spool fully into bore. Spool must insert smoothly.

7. Install poppet, springs and O-ring boss plugs. Torque O-ring boss plug to 60 in-lb.
1. Remove both wires from coil terminals.

2. Attach an ohmmeter across the coil terminals.

3. A reading of approximately 7 ohms indicates the coil is good. A good coil draws approximately 1.5 amps.

NOTE: Using probe to move spool may shear contamination which was affecting spool movement.

1. Remove coils from the solenoid cartridge valves and remove cartridge valves from manifold. Look for visible contamination or damaged seals. Check for stuck spools with a plastic, aluminum, or soft brass probe by pushing on the spring-loaded internal spool from the end of the valve. The spool should move freely through its entire travel.

NOTE: Using probe to move spool may shear contamination which was affecting spool movement.

2. Bench test the cartridge valve by installing a coil on the stem and applying 12V and ground. Watch through the side ports for internal spool travel.

If the cartridge valve spool is stuck or its travel is restricted, replace the cartridge. If the cartridge valve is in good condition, clean it with parts cleaning solvent and dry with compressed air, being careful not to damage the seals. Check the spool travel again in case any internal contaminants were dislodged during cleaning. Re-oil the cartridge valve seals and o-rings and reinstall the cartridge valve, torquing to 10 ft-lb. Install the coils and torque retaining nuts to 4 ft-lb.

NOTE: If contamination is seen in more than one component, it can be reasonably assumed that the entire system is contaminated and in order to perform a proper repair, the entire hydraulic unit must be disassembled and cleaned. The hoses and cylinders must also be disassembled and cleaned. The source of the contamination must be located and repaired before reassembly.
VEHICLE HEADLAMP TEST

Refer to Electrical Schematic.

To check the vehicle headlamps the following conditions must be met:

1. FISHER® park, turn, and DRL wires (if applicable) must be connected.
2. The vehicle control harness is plugged into position 1 of the Isolation Module.
3. The vehicle lighting harness is plugged into position 2 of the Isolation Module.
4. The vehicle ignition switch must be in the ON position.

NO LEFT LOW BEAM

Troubleshoot the faulty vehicle condition.

Did vehicle left low beam function before installing plug-in harnesses?

YES

Is left plug-in harness connected to position 4 of the Isolation Module?

YES

Is plug-in harness connected to vehicle left headlamp and/or vehicle connector?

YES

Is configuration plug installed and configured per instructions?

YES

NOTE: 1999-20_GMC All New Sierra and 1999-20_Chevy Silverado proceed to positive headlamp test.

NO

Configure and install configuration plug per instructions.

NO

NO

NO

NO

NO

Using the Isolation Module Tester, perform the Isolation Module Test.

NO

Is ground on position K of the plug-in harness 10-pin connector?

YES

NO

Is ground on position A of the plug-in harness 10-pin connector?

YES

NO

Configure and install configuration plug per instructions.

NO

Is configuration plug installed and configured per instructions?

YES

Is ground on position A of the plug-in harness 10-pin connector?

YES

NO

Configure and install configuration plug per instructions.

NO

Is ground on position K of the plug-in harness 10-pin connector?

YES

NO

Configure and install configuration plug per instructions.

NO

Is ground on position A of the plug-in harness 10-pin connector?

YES

NO

Configure and install configuration plug per instructions.

NO

Is ground on position K of the plug-in harness 10-pin connector?
NO RIGHT LOW BEAM

Did vehicle right low beam function before installing plug-in harnesses? YES NO

Troubleshoot the faulty vehicle condition.

Is right plug-in harness connected to position 4 of the Isolation Module? YES NO

Connect to correct Isolation Module connector.

Is plug-in harness connected to vehicle right headlamp and/or vehicle connector? YES NO

Connect to proper connectors.

Do headlamps have a negative or positive common? NEGATIVE POSITIVE

Is ground on position K of the plug-in harness 10-pin connector? YES NO

Using the Isolation Module Tester, perform the Isolation Module Test.

Disconnect plug-in harness from position 4 of the Isolation Module. Turn on the headlamps in the low beam mode. Is 12 volts on position A of the plug-in harness 10-pin connector? YES NO

Is ground on position A of the plug-in harness 10-pin connector? YES NO

Check for faulty connection or a miswired headlamp connector. Check for blown vehicle headlamp fuse.

Disconnect plug-in harness from position 4 of the Isolation Module. Turn on the headlamps in the low beam mode. Is 12 volts on position A of the plug-in harness 10-pin connector? YES NO

Using the Isolation Module Tester, perform the Isolation Module Test.

Is ground on position K of the plug-in harness 10-pin connector? YES NO

Check for faulty connection or a miswired headlamp connector. Check for blown vehicle headlamp fuse.
VEHICLE HEADLAMP TEST

NO LEFT HIGH BEAM

Did vehicle left high beam function before installing plug-in harnesses?

YES

Troubleshoot the faulty vehicle condition.

NO

Connect to the correct Isolation Module connector.

Is left plug-in harness connected to position 3 of the Isolation module?

YES

Is plug-in harness connected to vehicle left headlamp and/or vehicle connector?

NO

Connect to proper connectors.

NO

Did vehicle left high beam function before installing plug-in harnesses?

YES

Is left plug-in harness connected to position 3 of the Isolation module?

NO

Troubleshoot the faulty vehicle condition.

YES

Do headlamps have a negative or a positive common?

NEGATIVE

Disconnect plug-in harness from position 3 of Isolation Module. Turn on headlamps in high beam mode. Is 12 volts on position B of the plug-in harness 10-pin connector?

YES

Using the Isolation Module Tester, perform the Isolation Module Test.

NO

Check for faulty connection or a miswired headlamp connector. Check for blown vehicle headlamp fuse.

YES

Is ground on position K of the plug-in harness 10-pin connector?

YES

Using the Isolation Module Tester, perform the Isolation Module Test.

NO

Is ground on position B of the plug-in harness 10-pin connector?

NOTE: Dodge Rams equipped with sport package (HB1 and HB5 headlamps) must also check for ground on position C.

YES

Disconnect plug-in harness from position 3 of Isolation Module. Turn on headlamps in high beam mode. Is 12 volts on position K of the plug-in harness 10-pin connector?

POSITIVE

Disconnect plug-in harness from position 3 of Isolation Module. Turn on headlamps in high beam mode. Is 12 volts on position B of the plug-in harness 10-pin connector?
NO RIGHT HIGH BEAM

Did vehicle right high beam function before installing plug-in harnesses? NO

Troubleshoot the faulty vehicle condition.

Did vehicle right high beam function before installing plug-in harnesses? YES

Is right plug-in harness connected to position 4 of the isolation module? NO

Connect to the correct isolation module connector.

Is the plug-in harness connected to the vehicle right side headlamp and/or vehicle connector? NO

Connect to proper connectors.

Do headlamps have a negative or a positive common? NEGATIVE

Disconnect plug-in harness from position 4 of the isolation module. Turn on the headlamps in the high beam mode. Is 12 volts on position B of the plug-in harness 10-pin connector? NO

Check for faulty connection or a miswired headlamp connector. Check for blown vehicle headlamp fuse.

Do headlamps have a negative or a positive common? POSITIVE

Disconnect plug-in harness from position 4 of the isolation module. Turn on the headlamps in the high beam mode. Is 12 volts on position B of the plug-in harness 10-pin connector? YES

Is ground on position K of the plug-in harness 10-pin connector? NO

Check for faulty connection or a miswired headlamp connector. Check for blown vehicle headlamp fuse.

Using the isolation module tester, perform the isolation module test.

Is ground on position K of the plug-in harness 10-pin connector? YES

NOTE: Dodge Rams equipped with sport package (HB1 and HB5 headlamps) must also check for ground on position C of the plug-in harness 10-pin connector.
SNOWPLOW HEADLAMP TEST

Refer to Electrical Schematic.

To check the snowplow headlamps, the following conditions must be met:

1. All vehicle lights must be functioning correctly with the Isolation Module installed. If the vehicle lights are not functioning correctly, run the Vehicle Headlamp Test before proceeding.

2. FISHER® park, turn, and DRL wires (if applicable) must be connected.

3. The snowplow lighting harness must be connected to the vehicle lighting harness.

4. The vehicle ignition switch must be in the ON position.

NO LEFT LOW BEAM

- Is the snowplow lighting harness connected to the vehicle lighting harness at the grille? NO
- Connect both harnesses together.

- Do headlamps have a negative or a positive common? NEGATIVE
  - Remove headlamp bezel. Turn on headlamps in the low beam mode. Is 12 volts on the black wire from the headlamp plug? NO
  - Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position B of the 10-pin connector and the light blue wire on the headlamp plug? NO
  - Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 6 of the snowplow lighting harness plug and the black wire on the headlight connector? NO
  - Replace snowplow lighting harness.

- Replace vehicle lighting harness.

- Using the Isolation Module Tester, perform Isolation Module Test.
  - Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 11 of the snowplow lighting harness plug and light blue wire of the headlight connector? NO
  - Replace snowplow lighting harness.

- Replace snowplow lighting harness.

- Replace vehicle lighting harness.

- Replace the sealed beam.

- Using the Isolation Module Tester, perform Isolation Module Test.

- Connect the black/orange ground wires together.

- Is the black/orange ground wire from the vehicle control harness and the vehicle lighting harness connected? YES
  - Connect the black/orange ground wires together.

- Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness? NO
  - Connect the black wire to the negative battery terminal.

- Is the vehicle cable assembly black wire connected to the negative side of the battery? NO
  - Connect both harnesses together.

- Is the vehicle cable assembly black wire connected to the negative side of the battery? YES
  - Connect the black wire to the negative battery terminal.

- Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness? NO
  - Connect the black wire to the negative battery terminal.

- Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness? YES
  - Connect the black/orange ground wires together.

- Is the vehicle ignition switch in the ON position? YES
  - Using the Isolation Module Tester, perform Isolation Module Test.

- Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position B of the 10-pin connector and the light blue wire on the headlamp plug? NO
  - Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 6 of the snowplow lighting harness plug and the black wire on the headlight connector? NO
  - Replace snowplow lighting harness.

- Replace snowplow lighting harness.

- Replace vehicle lighting harness.

- Replace vehicle lighting harness.

- Go to A
NO LEFT LOW BEAM, CONTINUED

Remove headlamp bezel. Turn on headlamps in low beam mode. Is there ground on the black wire from the headlamp plug?

Is 12 volts on the light blue wire from the headlamp plug?

Using the Isolation Module Tester, perform Isolation Module Test.

Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position J of 10-pin connector and light blue wire on the headlamp plug?

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 6 of the snowplow lighting harness plug and the black wire on the headlamp connector?

Replace snowplow lighting harness.

Replace vehicle lighting harness.

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 11 of the snowplow lighting harness plug and the light blue wire on the headlamp connector?

Replace snowplow lighting harness.

Replace vehicle lighting harness.

Using the Isolation Module Tester, perform Isolation Module Test.
NO RIGHT LOW BEAM

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

<table>
<thead>
<tr>
<th>YES</th>
<th>Is the vehicle cable assembly black wire connected to the negative side of the battery?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Connect both harnesses together.</td>
</tr>
</tbody>
</table>

Do headlamps have a negative or a positive common?

<table>
<thead>
<tr>
<th>NEGATIVE</th>
<th>Remove headlamp bezel. Turn on headlamps in the low beam mode. Is 12 volts on the black/white wire from the headlamp plug?</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITIVE</td>
<td>Replace the sealed beam.</td>
</tr>
</tbody>
</table>

Using the Isolation Module Tester, perform Isolation Module Test.

<table>
<thead>
<tr>
<th>YES</th>
<th>Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position E of the 10-pin connector and the black/white wire on the headlamp plug?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Replace vehicle lighting harness.</td>
</tr>
</tbody>
</table>

Replace snowplow lighting harness.

<table>
<thead>
<tr>
<th>YES</th>
<th>Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 1 of the snowplow lighting harness plug and the black/white wire on the headlamp connector?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Replace snowplow lighting harness.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YES</th>
<th>Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 5 of the snowplow lighting harness plug and the blue/orange wire on the headlamp connector?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Replace snowplow lighting harness.</td>
</tr>
</tbody>
</table>

Using the Isolation Module Tester, perform Isolation Module Test.

<table>
<thead>
<tr>
<th>YES</th>
<th>Replace vehicle lighting harness.</th>
</tr>
</thead>
</table>

Disconnect the black/orange ground wires together.

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

<table>
<thead>
<tr>
<th>YES</th>
<th>Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Connect the black/orange ground wires together.</td>
</tr>
</tbody>
</table>

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

<table>
<thead>
<tr>
<th>YES</th>
<th>Is the black/orange ground wire from the vehicle control harness and the vehicle lighting harness connected?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Connect the black/orange ground wires together.</td>
</tr>
</tbody>
</table>

Connect the black/orange ground wires to the negative battery terminal.

Is the vehicle cable assembly black wire connected to the negative side of the battery?

<table>
<thead>
<tr>
<th>YES</th>
<th>Is the black/orange ground wire from the vehicle control harness and the vehicle lighting harness connected?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Connect the black/orange ground wires together.</td>
</tr>
</tbody>
</table>

Connect both harnesses together.

Is ground on the blue/orange wire from the headlamp plug?

<table>
<thead>
<tr>
<th>YES</th>
<th>Replace the sealed beam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Using the Isolation Module Tester, perform Isolation Module Test.</td>
</tr>
</tbody>
</table>

Disconnect vehicle lighting harness from position 2 of Isolation Module. Is there continuity between position E of the 10-pin connector and the black/white wire on the headlamp plug?

<table>
<thead>
<tr>
<th>YES</th>
<th>Replace vehicle lighting harness.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 1 of the snowplow lighting harness plug and the black/white wire on the headlamp connector?</td>
</tr>
</tbody>
</table>

Replace snowplow lighting harness.
SNOWPLOW HEADLAMP TEST

NO RIGHT LOW BEAM, CONTINUED

1. **B**
   - **POSITIVE**
   - Remove headlamp bezel. Turn on headlamps in the low beam mode. Is there ground on the black/white wire from the headlamp plug?
   - Yes
     - Is 12 volts on the blue/orange wire from the headlamp plug?
     - Yes
       - Replace the sealed beam.
     - No
       - Dis连续 vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position K of the 10-pin connector and the blue/orange wire on the headlamp plug?
       - Yes
         - Using the Isolation Module Tester, perform **Isolation Module Test**.
       - No
         - Dis连续 snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 1 of the snowplow lighting harness plug and the black/white wire on the headlamp connector?
         - Yes
           - Replace snowplow lighting harness.
         - No
           - Replace snowplow lighting harness.

2. **NO**
   - Replace vehicle lighting harness.

3. **YES**
   - Using the Isolation Module Tester, perform **Isolation Module Test**.
SNOWPLOW HEADLAMP TEST

NO LEFT HIGH BEAM

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

- YES: Is the vehicle cable assembly black wire connected to the negative side of the battery?
  - NO: Connect both harnesses together.
  - YES: Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness?
  - NO: Connect the black wire to the negative battery terminal.

- NO: Connect the black/orange ground wires together.

Do headlamps have a negative or a positive common?

- NEGATIVE: Remove headlamp bezel. Turn on headlamps in the high beam mode. Is 12 volts on the white wire from the headlamp plug?
  - NO: Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position A of the 10-pin connector and the white wire on the headlamp plug?

- POSITIVE: Is ground on the light blue wire from the headlamp plug?
  - NO: Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 4 of the snowplow lighting harness plug and the white wire on the headlamp connector?
  - YES: Replace vehicle lighting harness.

- GO TO C

Using the Isolation Module Tester, perform Isolation Module Test.

Replace vehicle lighting harness.

Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position J of the 10-pin connector and the light blue wire on the headlamp plug?


- NO: Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 11 of snowplow lighting harness plug and the light blue wire on the headlamp connector?
  - NO: Replace snowplow lighting harness.
  - YES: Replace vehicle lighting harness.

Replace snowplow lighting harness.

Replace the sealed beam.

Go to C
NO LEFT HIGH BEAM, CONTINUED

C

POSITIVE

Remove headlamp bezel. Turn on headlamps in the high beam mode. Is there ground on the white wire from the headlamp plug?

YES

Is there continuity between position J of 10-pin connector and light blue wire on the headlamp plug?

NO

Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position A of the 10-pin connector and the white wire on the headlamp plug?

YES

Using the Isolation Module Tester, perform Isolation Module Test.

NO

Replace snowplow lighting harness.

YES

Disconnect snowplow lighting harness and vehicle lighting harnesses at the grille. Is there continuity between pin 4 of the snowplow lighting harness plug and the white wire on the headlamp connector?

NO

Replace snowplow lighting harness.

YES

Is 12 volts on the light blue wire from the headlamp plug?

NO

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 11 of the snowplow lighting harness plug and the light blue wire on the headlamp connector?

NO

Replace snowplow lighting harness.

YES

Using the Isolation Module Tester, perform Isolation Module Test.

Replace vehicle lighting harness.

Replace the sealed beam.
NO RIGHT HIGH BEAM

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

Yes

Is the vehicle cable assembly black wire connected to the negative side of the battery?

No

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

Yes

Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orange ground wire together.

No

Connect the black/orange ground wire to the negative battery terminal.

Yes

Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness?

Yes

Is the black/orange ground wire from the vehicle control harness and the vehicle lighting harness connected?

Yes

Connect the black/orange ground wires together.

NO

NONO

Connect the black/orange ground wires together.

NO

NONO

Connect the black/orange ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orange ground wire together.

No

Connect the black/orange ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the black/orange ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orANGE ground wire together.

No

Connect the black/orANGE ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the black/orANGE ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orANGE ground wire together.

No

Connect the black/orANGE ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the black/orANGE ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orANGE ground wire together.

No

Connect the black/orANGE ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the black/orANGE ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orANGE ground wire together.

No

Connect the black/orANGE ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

No

Connect the black wire to the negative battery terminal.

Yes

Is the black/orANGE ground wire from the vehicle cable assembly connected to the vehicle control harness?

No

Connect the black/orANGE ground wire together.

No

Connect the black/orANGE ground wire to the negative battery terminal.

YES

Is the snowplow lighting harness connected to the vehicle lighting harness at the grille?
SNOWPLOW HEADLAMP TEST

NO RIGHT HIGH BEAM, CONTINUED

Remove headlamp bezel. Turn on headlamps in the high beam mode. Is ground on the white/yellow wire from the headlamp plug?

Is 12 volts on the blue/orange wire from the headlamp plug?

Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position K of 10-pin connector and blue/orange wire on the headlamp plug?

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 3 of the snowplow lighting harness plug and the white/yellow wire on the headlamp connector?

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. Is there continuity between pin 5 of the snowplow lighting harness plug and the blue/orange wire on the headlamp connector?

Using the Isolation Module Tester, perform Isolation Module Test.

Replace snowplow lighting harness.

Replace vehicle lighting harness.

Replace snowplow lighting harness.

Using the Isolation Module Tester, perform Isolation Module Test.

Replace snowplow lighting harness.

Replace vehicle lighting harness.

Replace the sealed beam.
SNOWPLOW HEADLAMP TEST

**NO LEFT SNOWPLOW TURN SIGNAL LAMPS**

- **Is snowplow lighting harness connected to the vehicle lighting harness at the grille?**
  - YES: Connect both harnesses together.
  - NO: Is ground on BLK/ORN wire connected to the Park/Turn bulb assemblies?

- **Is the BLK/ORN wire from the plow lighting harness connected to the negative motor terminal?**
  - YES: Connect BLK/ORN wire to the neg. side of the motor terminal.
  - NO: Connect both cable assemblies. Is BLK/ORN wire from vehicle control harness and vehicle lighting harness connected?

- **Is plow cable Assy. connected to vehicle cable Assy. at grille?**
  - YES: Connect BLK/ORN ground wire together.
  - NO: NO

- **Is vehicle cable Assy. BLK wire connected to Neg. side of battery?**
  - YES: Connect BLK/ORN ground wire together.
  - NO: NO

- **Is BLK/ORN wire from vehicle control harness and vehicle lighting harness connected?**
  - YES: Replace defective bulbs.
  - NO: Replace snowplow plug-in harness.

- **Is snowplow Park/Turn fuse blown?**
  - YES: Replace fuse.
  - NO: Disconnect vehicle lighting harness from position 2 of the Isolation Module. Is there continuity between position G of the 10-pin connector and the junction of the gray and red wires?

- **Is ground on BLK/ORN wire connected to the Park/Turn bulb assemblies?**
  - YES: Are the Park/Turn bulbs seated correctly?
  - NO: NO

- **Remove left headlamp bezel. Is there continuity between neg. motor terminal and Park/Turn socket mounting plate?**
  - YES: Use Isolation Module Tester to perform Isolation Module Test
  - NO: Replace vehicle lighting harness.

- **Is there continuity between Pin C of the 10-pin Isolation Module connector and Position G of the 10-pin plug-in harness connector?**
  - YES: Replace vehicle lighting harness.
  - NO: Check all ground connections.

- **Is there continuity from Position G of the 10-pin connector to the left turn signal tap?**
  - YES: Check turn signal tap. Check vehicle turn signal circuit to ensure it is working correctly.
  - NO: Replace snowplow plug-in harness.

- **Is there continuity between Position G of the 10-pin connector and Position 8 of the vehicle lighting harness plug?**
  - YES: Replace snowplow lighting harness
  - NO: Disconnect the plug-in harness from Pos. 3 of the Isolation Module. Is there 12 volts on Pos.G of the plug—in harness 10-pin connector? When the left turn signal is activated?

- **Is there continuity between Pin C of the 10-pin Isolation Module connector and Position 8 of the vehicle lighting harness plug?**
  - YES: Replace vehicle lighting harness.
  - NO: Replace snowplow plug-in harness.

- **Disconnect snowplow lighting and vehicle lighting harnesses at the grille. On the snowplow lighting harness, is there continuity between position 8 of the snowplow lighting harness plug and the junction of the gray and red wires?**
  - YES: Tighten ground screw on Park/Turn Bulb Assy.
  - NO: Disconnect snowplow lighting harness and vehicle lighting harnesses at the grille. On the snowplow lighting harness, is there continuity between position 8 of the snowplow lighting harness plug and the junction of the gray and red wires?

- **Replace snowplow lighting harness**
SNOWPLOW HEADLAMP TEST

NO RIGHT SNOWPLOW TURNSIGNAL LAMPS

Is snowplow lighting harness connected to the vehicle lighting harness at the grille?

NO

Connect both harnesses together.

YES

Is the BLK/ORN wire from the plow lighting harness connected to the negative motor terminal?

NO

Connect BLK/ORN wire to the neg. side of the motor terminal.

YES

Is the BLK/ORN wire from the plow lighting harness connected to the negative motor terminal?

NO

Connect both cable assemblies.

YES

Is the BLK/ORN wire from vehicle control harness and vehicle lighting harness connected?

NO

Connect black wire to neg. battery terminal.

YES

Use Isolation Module Tester to perform Isolation Module Test

Is snowplow fuse blown?

YES

Replace fuse.

NO

Disconnect vehicle lighting harness from position F of the Isolation Module. Is there continuity between position F of the 10-pin connector and the purple and red wires?

NO

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. On the snowplow lighting harness, is there continuity between position 9 of the snowplow lighting harness plug and the junction of the purple and red wires?

NO

Replace Snowplow Lighting Harness

YES

Remove left headlamp bezel. Activate the vehicle's left turn signal. Is 12 volts present at the junction of the gray and red wires?

NO

Is snowplow fuse blown?

YES

Replace fuse.

NO

Disconnect vehicle lighting harness from position F of the Isolation Module. Is there continuity between position F of the 10-pin connector and the purple and red wires?

NO

Disconnect snowplow lighting and vehicle lighting harnesses at the grille. On the snowplow lighting harness, is there continuity between position 9 of the snowplow lighting harness plug and the junction of the purple and red wires?

NO

Replace Snowplow Lighting Harness

YES

Is ground on BLK/ORN wire connected to the Park/Turn bulb assemblies?

NO

Remove right headlamp bezel. Is there continuity between neg. motor terminal and Park/Turn socket mounting plate?

YES

Tighten ground screw on Park/Turn Bulb Assy.

NO

Is the BLK/ORN wire from vehicle control harness and vehicle lighting harness connected?

YES

Are the Park/Turn bulbs seated correctly?

NO

Replace defective bulbs.

YES

Use Isolation Module Tester to perform Isolation Module Test

On the vehicle lighting harness, is there continuity between pin 7 of the vehicle lighting harness plug and Pin C of the 10-pin isolation Module connector?

NO

Replace Vehicle Lighting Harness.

YES

Check all ground connections.

NO

Check turn signal tap. Check vehicle turn signal circuit to ensure it is working correctly.

NO

Replace Snowplow plug-in harness.

YES

On the vehicle lighting harness, is there continuity between pin 2 of the vehicle lighting harness and the negative terminal of the battery?

NO

Replace Snowplow plug-in harness.

YES

On the vehicle lighting harness, is there continuity from Position G of the 10-pin connector to the right turn signal tap?

NO

Check turn signal tap. Check vehicle turn signal circuit to ensure it is working correctly.

YES

Replace Snowplow plug-in harness.
SNOWPLOW HEADLAMP TEST

NO SNOWPLOW PARKING LIGHTS

Is snowplow lighting harness connected to vehicle lighting harness at the grille?

YES

Connect both harnesses together.

NO

Connect both harnesses together.

Remove headlamp bezels. Place the headlamp switch in the park lamp position. Is 12 volts on the junction of the brown wires?

YES

Is ground on the black/orange wire connected to the park/turn bulb assemblies?

YES

Are park/turn bulbs seated correctly?

YES

Replace fuse.

NO

Replace fuse.

NO

Is snowplow park/turn fuse blown?

YES

Replace fuse.

NO

Is ground on the black/orange wire connected to the park/turn bulb assemblies?

YES

Check, clean and tighten ground connections on the park/turn socket mounting plate and on the neg. motor terminal.

NO

Remove headlamp bezel. Check continuity between neg. motor terminal and park/turn socket mounting plate.

YES

Using the Isolation Module Tester, perform the Isolation Module Test.

NO

Discontinue snowplow lighting harness from position 2 of the Isolation Module. Is there continuity between position H of the 10-pin connector and the brown wires of the headlamp assemblies?

YES

Check all ground connections.

NO

Disconnect snowplow lighting harness and vehicle lighting harnesses at the grille. Is there continuity between pin 10 of the snowplow lighting harness plug and the brown wires of the headlamp assemblies?

YES

Disconnect the short plug-in harness from the Isolation Module. Is there continuity from position H of the plug-in harness 10-pin connector to the park light tap?

YES

Disconnect the snowplow lighting and vehicle lighting harnesses at the grille. On vehicle lighting harness is there continuity between pin 2 of the vehicle lighting harness and pin c of the 10-pin Isolation Module connector?

YES

On the vehicle lighting harness is there continuity between pin 2 of the vehicle lighting harness and the negative terminal of the battery?

NO

Check all ground connections.

NO

Replace defective bulbs.

Replace snowplow lighting harness.

Replace vehicle lighting harness.

Replace snowplow lighting harness.

Replace vehicle lighting harness.

Replace plug-in harness.

Replace plug-in harness.

Replace plug-in harness.

Check all ground connections.

NO

Disconnect the snowplow lighting and vehicle lighting harnesses at the grille. On vehicle lighting harness is there continuity between pin 2 of the vehicle lighting harness and the negative terminal of the battery?

YES

On the vehicle lighting harness is there continuity between pin 2 of the vehicle lighting harness and the negative terminal of the battery?
VEHICLE DAYTIME RUNNING LAMPS (DRL) TEST

To check the vehicle DRL system, the following conditions must be met:

1. Fully understand the operation of the vehicle DRL system before attempting to troubleshoot DRL problems on the snowplow.
2. All vehicle lighting systems must be functioning correctly before the Isolation Module is installed.
3. The Isolation Module and the associated harnesses have been installed using the installation instructions provided.
4. FISHER® DRL wires (if applicable) must be connected.
5. The vehicle ignition switch must be in the ON position.

**NO VEHICLE DRLs**

- Is left plug-in harness connected to position 3 of the Isolation Module?
  - YES: Is the plug-in harness connected to the vehicle left headlamp(s) and/or vehicle connector(s)?
    - YES: Is right plug-in harness connected to position 4 of the Isolation Module?
      - YES: Is plug-in harness connected to vehicle right headlamp(s) and/or vehicle connector(s)?
        - YES: Is vehicle control harness connected to position 1 of the Isolation Module?
          - YES: Are the beams used for the Daytime Running Lamps working properly during normal headlamp operation?
            - YES: Is the vehicle DRL fuse blown?
              - YES: Replace the fuse.
              - NO: Investigate vehicle DRL system.
            - NO: Replace any defective bulb(s) and then, using the Isolation Module Tester, perform the Isolation Module Test.
          - NO: Connect to correct Isolation Module connector.
        - NO: Connect to the proper connectors.
      - NO: Connect to correct Isolation Module connector.
    - NO: Connect to correct Isolation Module connector.
  - NO: Connect to the proper connectors.

- Is configuration plug jumpered correctly?
  - YES: Replace any defective bulb(s) and then, using the Isolation Module Tester, perform the Isolation Module Test.
  - NO: Investigate vehicle DRL system.

**NOTE:** 1999-2002 GMC All New Sierra and 1999-2002 Chevy Silverado do not require a configuration plug. The vehicle DRLs do not turn off when the snowplow is attached.
SNOWPLOW DAYTIME RUNNING LAMPS (DRL) TEST

To check the snowplow DRL system, the following conditions must be met:

1. Fully understand the operation of the vehicle DRL system before attempting to troubleshoot DRL problems on the snowplow.
2. All vehicle lighting systems must be functioning correctly before the Isolation Module is installed.
3. FISHER® DRL wires (if applicable) must be connected.
4. The vehicle ignition switch must be in the ON position.

**NO SNOWPLOW DRLs**

1. Is snowplow lighting harness connected to the vehicle lighting harness at the grille?
   - **YES**
   - **NO**
   - Connect both harnesses at the grille?
   - Run the snowplow and vehicle lighting harness tests?
   - Are snowplow headlamps operating correctly?
   - **YES**
   - **NO**
   - Is vehicle DRL system functioning correctly?
   - **YES**
   - **NO**
   - Correct the vehicle problem.
   - Is vehicle DRL system functioning correctly?
   - **YES**
   - **NO**
   - For 1999-20_ GMC All New Sierra and 1999-20_ Chevy Silverado: Disconnect the short plug-in harness from the Isolation Module. Is 12 volts on position F of the 10-pin connector?
   - **YES**
   - **NO**
   - Refer to paragraph 1 above.
   - For all other vehicles:
     - Using the Isolation Module Tester, perform Isolation Module Test.
     - Is there continuity between position F of the 10-pin connector and the pink DRL tap?
     - **YES**
     - **NO**
     - Replace the short plug-in harness.
     - Is the pink wire from the plug-in harness connected to the DRL lamp positive feed wire?
     - **YES**
     - **NO**
     - Connect the pink wire.
REMOVABLE SPRING TOOL

To Replace A Spring On The Blade, Follow The Instructions Below.

CAUTION
Servicing the trip springs without special tools and knowledge could result in personal injury. See your authorized FISHER® outlet for service.

1. Insert the threaded rod in through the hole in the channel weldment. Be sure the threaded hole in the tab on the rod is nearest to the channel.

2. Place the assembly on to the top anchor above the spring as illustrated. Be sure to place the spring bar in between the tabs on the rod. Insert the 1/2 x 1-1/2" Gr. 5 cap screw through the outside tab, through the hole in the spring bar, and tighten into the threaded hole.

3. Drop the 1/2" flat washer Gr. 8 over the threaded rod and fasten the nut to the threaded rod. Tighten the nut until the spring bar is raised enough to insert the pin through the pin hole. Center the pin within the hole.

4. Loosen the nut to lower the spring bar. Remove the spring tool assembly by removing the 1/2" cap screw.

5. Remove the spring from the blade by removing the bolt from the bottom of the spring bar.

6. Insert the new spring with the spring bar up through the top anchor on the blade. Fasten the bottom of the spring bar to the anchor on the trip edge with the previously removed fasteners. Tighten.

7. Repeat steps 1 and 2 above.

8. Repeat step 3 above, except remove the pin from the spring bar.

9. Repeat step 4 above.